

**ROAD CAPACITY MANAGEMENT TRAINING AS AN EFFORT TO STRENGTHEN
COMPETENCE OF THE TRANSPORTATION WORKFORCE: A COLLABORATIVE
COMMUNITY SERVICE PROGRAM**

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ABSTRACT

Capacity management is a strategic effort to optimize road networks. Capacity management training can enhance understanding of urban transportation road capacity management. This activity aims to provide participants with theoretical and practical knowledge about road capacity management. Participants in the training come from various transportation agencies that implement activities spread across different regions. The training involved the delivery of materials, interactive discussions, and evaluations using pre- and post-tests. The evaluation results showed a significant increase in participants' understanding 30%. The implications of this training are highly relevant to skill development in building workforce competence in the transportation sector.

Keywords: competency; evaluation; road capacity management; transportation; training

INTRODUCTION

Capacity management is an important technical aspect of urban transportation systems. This need is increasing along with urbanization and the number of vehicles, as well as the rising traffic congestion. The basic measure used to determine the level of service on a road is based on the ratio between the amount of traffic and the available capacity. A road segment with a high level of service can process incoming vehicles without experiencing congestion (Mansyur, 2024; Suharyadi, 2023). In this case, the ratio of traffic volume to road capacity, known as the degree of saturation (DS), is one of the most significant indicators. The operational performance of a road segment is used to describe the congestion conditions within a road network (Hasyim et al., 2023; Wadu, 2020). The level of service on a road is another important measure that indicates the quality of traffic flow. A volume-to-capacity (V/C) ratio shows how well the level of service is working by comparing the amount of traffic to the main road's capacity. A higher V/C ratio indicates a low level of service, which is comparable to the level of congestion and delay. Tingkat layanan rendah, yang ditunjukkan oleh rasio V/C yang lebih tinggi, sebanding dengan tingkat kemacetan dan tundaan (Assalam et al., 2023; Haftram & Asrib, 2022). Effective traffic management can significantly improve the level of service (LOS) through signal adjustments and geometric road improvements (Adam, 2024; Wang et al., 2022). Additionally, to enhance intersection efficiency, real-time signal interval adjustments according to existing traffic conditions are necessary (Dobrota et al., 2022).

The level of service (LOS) for many roads in Indonesia ranges from D to F. This congestion is exacerbated by various side obstacles, including illegal parking, street vendor activities, and ineffective intersection management (Kariyana, 2024). Training can effectively enhance participants' problem-solving skills in complex scenarios, which is highly relevant in the

context of urban transportation management (Supriatna et al., 2020). Providing traffic management personnel with better skills and knowledge, cities can develop more effective strategies to reduce congestion and improve overall traffic flow. This training-based community service aims to strengthen the capacity of the transportation workforce in various regions of Indonesia through an interactive approach that includes the delivery of theory, case studies, and evaluations to improve the quality of transportation in Indonesia.

METHOD

This community service activity was held at the Politeknik Keselamatan Transportasi Jalan and attended by 30 participants from various transportation agencies. This activity is based on technical training to enhance the understanding of urban road capacity management. The training methods include:

1. Delivery of Material

The material covers the basic concepts of road capacity, degree of saturation, and level of service. Lessons are delivered interactively through presentations and case studies.

2. Group Discussion

Participants are divided into teams and real field case studies are discussed.

3. Pre-Test Assessment

This pre-test will be conducted before the training to assess how much participants understand about urban road capacity management.

4. Post-Test Assessment

Then followed by a post-test to measure how much understanding has been gained after attending this training.

Statistical evaluation of the pre-test and post-test will be conducted to determine the effectiveness of the training.

RESULTS AND DISCUSSION

Training Activities

Thirty participants from various transportation agencies and highway operators from local and provincial governments attended the training activities. Participants come from diverse educational backgrounds in civil engineering, transportation engineering, and transportation management, providing a variety of perspectives in discussions and training activities. The majority of participants have more than five years of work experience in the transportation sector, which allows them to bring valuable practical insights into the training process. A mix of practical knowledge and theory-based courses allows for a productive exchange of knowledge during the training process. As shown in the table below, participants come from various different institutions, and the training is diverse both regionally and institutionally, allowing for higher validity and relevance of the training outcomes.

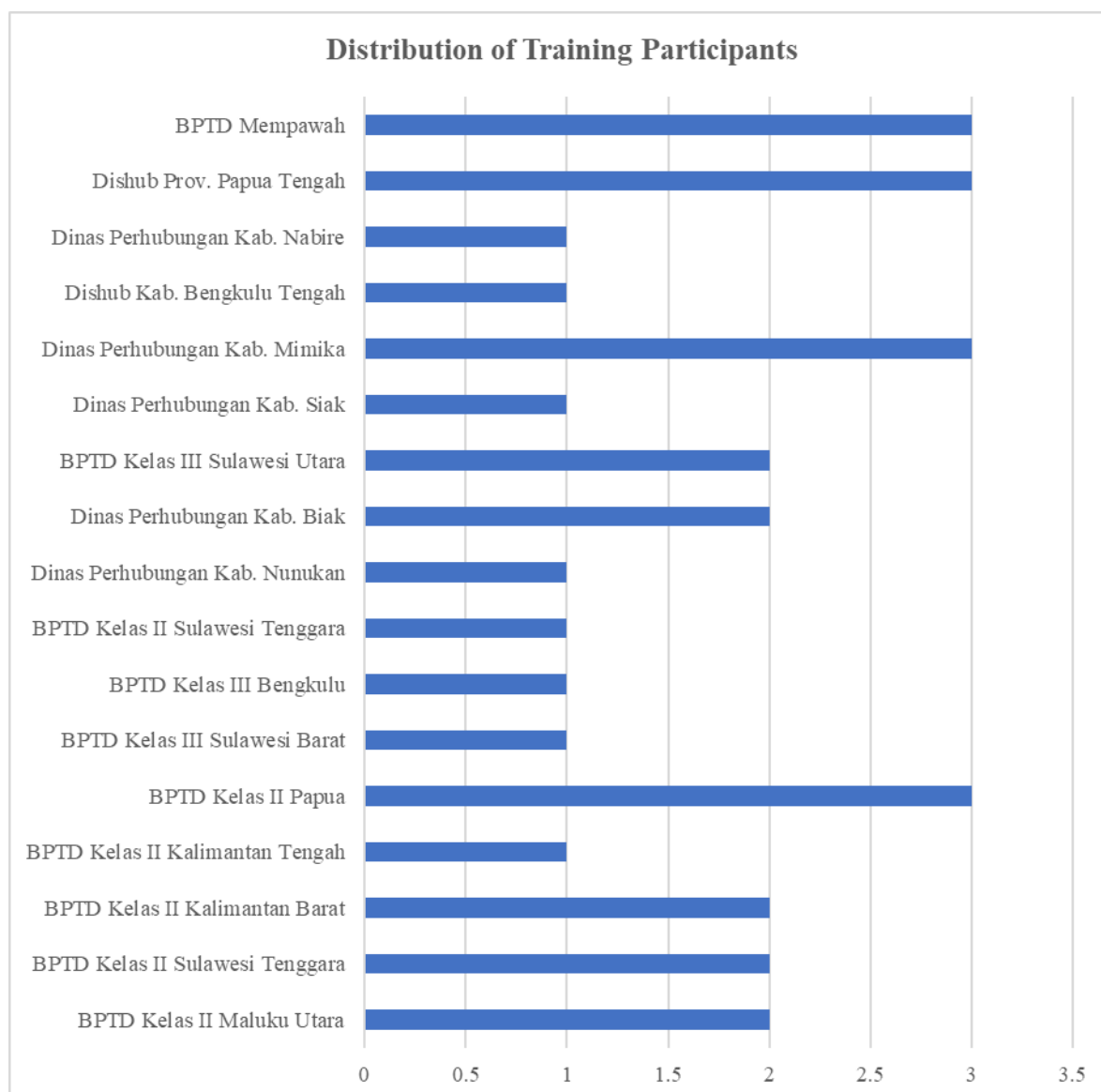


Figure 1. Distribution of Training Participants

The training started with a presentation on the basic idea of road capacity (C0). This included basic capacity information, capacity correction factors based on real-world conditions, and side friction. The training also covered the concept of Degree of Saturation (DJ), which included information on the traffic flow-to-capacity ratio and interactive simulations for calculating DJ under different conditions. Level of Service (LOS) with material on LOS criteria based on PKJI Dirjen Bina Marga 2023, accompanied by a case study evaluating the LOS of urban roads. Along with the delivery of this material, the training includes interactive simulations where participants are tasked with analyzing traffic data, group discussions where participants discuss road capacity management scenarios, and case studies where participants analyze real urban issues to identify problems and potential solutions in handling them. Practical activities include field data measurement, where participants are divided into groups to collect traffic data, speed, and side obstacles at existing locations. Field data analysis: Participants analyze field data to calculate road capacity, degree of saturation, and road service level. Presentation of practical results: Each group presents their analysis results, including potential solutions to improve road performance and efficiency.



Figure 2. Training Activities

Pre-Test

Before the training, 30 participants took a pre-test. The pre-test instrument consists of three main categories: basic understanding, case study analysis, and decision-making. Scores are given on a scale of 0–100, with an overall average pre-test score of 65. The demographics of the participants (pre-test data) are described using the average score from each category, and the score distribution is shown to get a bigger picture. According to the average pre-test scores, they fall into the category of fairly excellent in basic skills with a score of 70. However, there is a gap in case study analysis skills with an average score of 60 and decision-making with an average score of 65. These findings indicate that although they possess adequate initial theoretical knowledge, they are unable to transfer concepts to daily tasks or make strategic decisions.

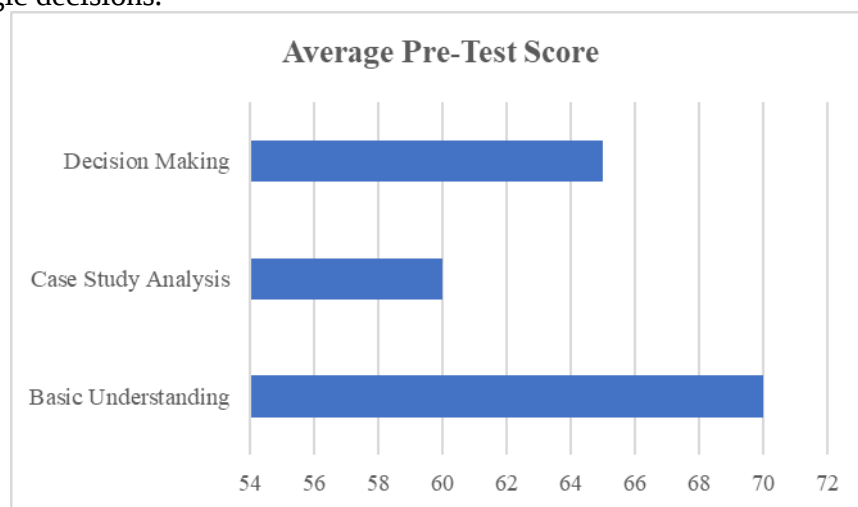
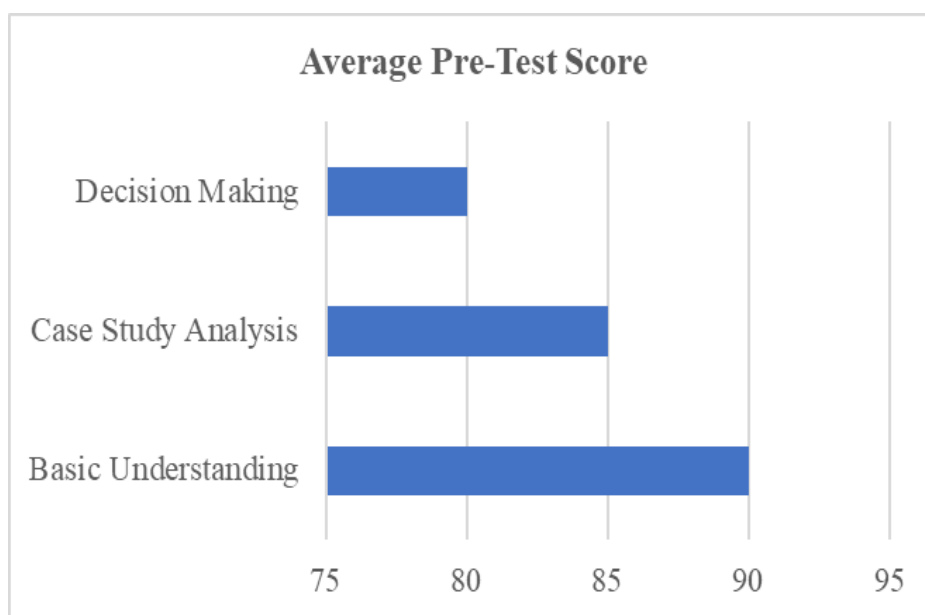


Figure 3. Pre-Test Score Distribution

Distribusi skor pre-test divisualisasikan dalam sebuah histogram Gambar 3. Histogram ini menunjukkan konsentrasi skor peserta dalam kategori pemahaman dasar dengan sedikit penyebaran dalam kategori analisis dan pengambilan keputusan. Ini menunjukkan bahwa sebagian besar peserta memiliki pemahaman yang memadai tetapi masih memerlukan pelatihan intensif untuk meningkatkan keterampilan analitis dan strategis.

Post-Test

The post-test is conducted after completing the training to measure participants' progress in three categories: basic understanding, case studies, and decision-making. The post-test data plays a crucial role in assessing the effectiveness of the training and the extent to which participants comprehend the training content. This article attempts to study the movement of participants' scores before and after the training, with the perspective of how much the average score increased and identifying categories with the most improvement during this period. The post-test results show that the participants' overall average score increased from 65 in the pre-test to 85 in the post-test. Consequently, the training led to an overall increase of 30%. The result is that all categories experienced significant improvements. The aspect of case study analysis shows the largest percentage increase (41.67%), indicating that the case-based approach may be the most effective in enhancing participants' analytical skills.



Gambar 4. Distribusi Skor Post-Test

Figure 4 We created a histogram to visualize the distribution of post-test scores. This diagram shows a higher score distribution in the basic understanding category with an average score of 90, followed by case study analysis at 85, and decision-making at 80. Overall, these findings indicate that the training has successfully improved the participants' skills overall. The comparison and changes in the level of understanding between the Pre-Test and Post-Test can be seen in Figure 5 below.

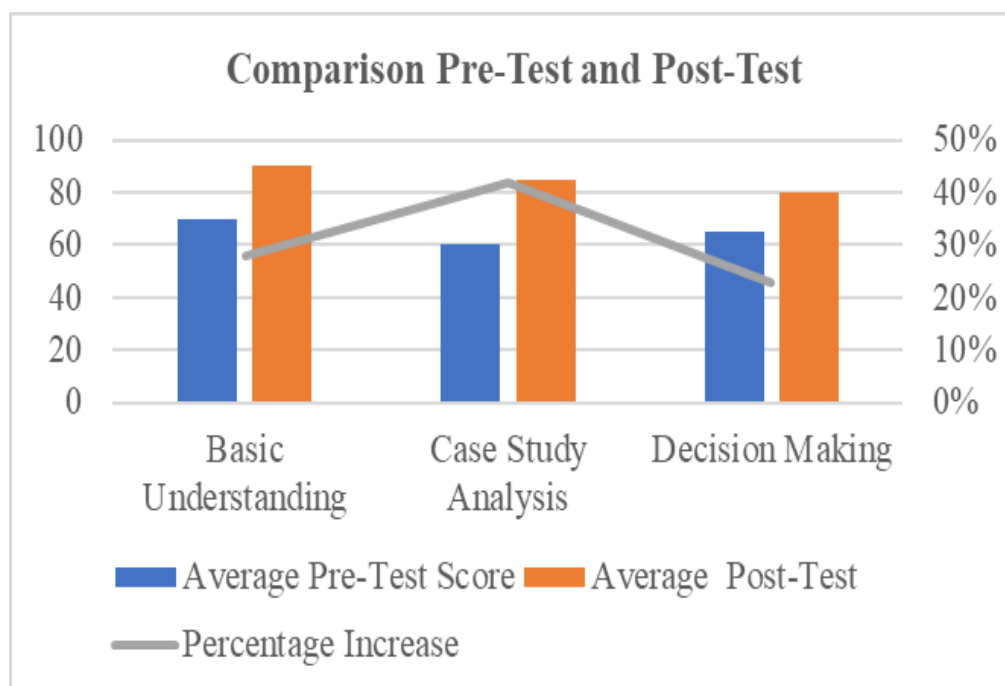


Figure 5. Comparison of Pre-Test Vs Post-Test

Figure 5 presents a comparison of the average pre-test and post-test scores for each group. All categories showed improvement, with case study analysis skills showing the most notable change. A comprehensive analysis of pre-test and post-test scores shows the effectiveness of the training in enhancing participants' understanding across various categories. There was a significant rise from an average score of 70 on the pre-test to 90 on the post-test in the basic understanding category. This is a 28% improvement that shows how well the participants were able to build a strong theoretical foundation. The case study analysis category had the highest increase, with the average rising from 60 to 85, showing an improvement of about 42%. These results were obtained through group discussions and the use of real case studies that encouraged understanding of field applications. On the other hand, the decision-making category also increased from an average pre-test score of 65 to 80 on the post-test, or an improvement of 23%. This fact also confirms the effectiveness of simulation exercises and field practice in helping participants apply the theories learned. The effectiveness of the training in thoroughly enhancing participants' strategic thinking skills has been proven. The implications of this training are highly relevant to the development of job-related skills in the transportation sector, particularly in addressing traffic congestion issues in urban areas. This training can be used as a model for future technical training due to significant improvements. Considering the importance of effective infrastructure development, the results of this research provide a strong foundation for the development of educational programs at the national level.

CONCLUSION

The results of the activities show a significant increase in understanding among the training participants. The implications of this training are highly relevant to the development of job-related skills in the transportation sector. The theory taught through the training can be well applied and implemented in group discussions, interactive simulations, and practical tasks. The training method is very effective for participants and provides relevant long-term experience in skill enhancement for jobs in the transportation industry. The average post-test

score was 30% compared to the pre-test. The category for basic understanding went up 28%, the category for case study analysis went up 42%, and the category for decision-making went up 23%. This shows that simulation exercises and field practice are effective at helping people use what they have learned. The results of this activity prove that this program can be used in various fields of transportation. This result can provide significant contributions to training strategies in the transportation sector nationally.

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